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ABSTRACT

This document provides administrators and instructional supervisors a framework for thinking about teaching and learning in secondary schools and suggests specific focal points for working with teachers to maintain and improve teaching effectiveness. The first section contains a discussion of instructional time and its meaning for secondary teaching. The second section is focused on the nature of academic work in secondary classes as a way to examine students' opportunities to learn the curriculum. The third section is directed to the basic instructional conditions that lead to productive use of classroom time. These basic conditions include provisions for classroom organization and management and instructional processes such as explanation, feedback, and correction of errors. This section also contains a brief guide to the instructional dimensions of individualized instructional programs and cooperative group systems. The effectiveness of direct instruction is emphasized. The final section contains a summary of basic principles that should shape the instructional decisions in effective secondary schools. A seven-page list of references concludes the document. (JD)

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Effective Classroom Practices

for Secondary Schools

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The University of Texas at Austin

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What students learn in school depends in large measure upon what happens in classrooms. This chapter contains a summary of what is known about the conditions that need to exist in secondary classrooms if students are to achieve the outcomes expected at this level of schooling. The purpose of this summary is twofold: (1) to provide administrators and instructional supervisors with a framework for thinking about teaching and learning in junior and senior high school classrooms as they make decisions about instruction; and (2) to suggest specific focal points for working directly with teachers to maintain and improve teaching effectiveness.

Several advances have recently been made in our knowledge of effective classroom practices (for reviews, see Good, 1983; Rosenshine, 1983). Because much of the research has focused on teaching basic reading and arithmetic skills in the early elementary grades and on mathematics in the junior high school, data on teaching in secondary classrooms are limited. Nevertheless, findings from existing studies, when combined with related classroom and laboratory research, are beginning to suggest a comprehensive framework for understanding effective teaching (see Doyle, 1983). This framework is used here to build a model of effective practices in secondary classrooms.

The chapter is organized into four major sections. The first section contains a discussion of instructional time and its meaning for secondary teaching. The second section is focused on the nature of academic work in secondary classes as a way to examine students' opportunities to learn the curriculum. The third section is directed to the basic instructional conditions that lead to productive use of classroom time. These basic conditions include provisions for classroom organization and management and instructional processes such as explanation, feedback, and correction for errors. This section also contains a brief guide to the instructional dimensions of individualized instructional programs and cooperative group systems. The final section contains a summary of basic principles that should shape instructional decisions in effective secondary schools.

Time, Curriculum, and Teaching

Quantity of teaching has received considerable attention in research on teaching, especially in elementary classrooms, and many recent reform proposals have emphasized time as a central mechanism for school improvement (see Denham & Lieberman, 1980). There are, however, some important factors to consider when is used as a measure of instructional quality or a target for improvement. In this opening section, some of these factors are discussed as a background for examining basic instructional processes.

Quality of Instruction

Research on instructional time, as measured by such indicators as time on task or student engagement rate, have produced two major findings (see Denham & Lieberman, 1980; Karweit, 1982; Soar & Soar, 1983). First, there are sometimes large differences across classrooms, schools, and school systems in the amount of time students spend learning various components of the curriculum. Second, differences in instructional time are often associated with student achievement.

This research has appropriately called attention to time as an important element to consider in instructional planning and decision making. If students are given only a small amount of instructional time, then they are likely to learn less content than students who are given more time. Also, if a substantial increase in time allocated to a particular curriculum area is made, there are likely to be dramatic gains in student achievement in that area.

The findings do <u>not</u> mean, however, that simply increasing the quantity of instructional time in a school, by lengthening the school day or the school year for example, will automatically improve student achievement. Increasing the amount of poor quality instructional time--time spent listening to vague lectures, watching films unrelated to the curriculum, or copying sentences from the textbook to complete worksheets--is not likely to benefit anyone. To improve instruction it is often necessary to go beyond simple measures of instructional time or student engagement to examine how time in classrooms is filled and what teachers do to affect the quality of the time students spend engaged with subject matter. It is to these dimensions of quality that the discussion now turns.

<u>Dimensions of Instructional Quality</u>

The available research underscores two important dimensions of instructional effectiveness. The first of these dimensions is <u>opportunity to learn the content of the curriculum</u>. Findings from the Beginning Teacher Evaluation Study (Fisher, Berliner, Filby, Marliave, Cahen, & Dishaw, 1980) indicate that is is not simply time but rather academic learning time--time spent working successfully with content measured on the achievement test--that is associated with student success. In thinking about instruction time, in other words, it is necessary to consider not only whether students are paying attention but also what they are doing: solving equations, writing descriptive essays, or formulating hypotheses for a laboratory experiment. Measured in this way, time on task is partially an indicator of whether essential curriculum content is included in the academic program of a class and is being emphasized. In their review of studies which compared different science curricula, Walker and Schaffarzick (1974) found that inclusion and emphasis were basic factors accounting for differences in program effectiveness. Opportunity to learn, then, would seem to be a fundamental condition for student achievement.

The second important dimension is the quality of instruction. Given equal emphasis on content, differences in achievement will result from differences in the quality of instruction, that is, the design of assignments, the clarity of the teacher's explanations, the chances students have to practice, the extent to which progress is monitored, and the availability and accuracy of feedback. Furthermore, the quality of instruction will affect the time students need to learn (see Bloom, 1976). Students may need more time to learn when they do not receive adequate instructional support (see Soar and Soar, 1983).

Summary

Research on instructional time is best used to draw attention to the underlying mechanisms which produce achievement in classrooms. Adequate time must be provided for instruction to occur, but the available time must be filled with content that represents important pieces of the curriculum and students must be given high quality opportunities to learn the content. Because of the importance of these mechanisms, the rest of this chapter is focused on the instructional conditions that affect the quality of time spent in secondary classrooms.

Opportunity to Learn

Students learn whatever curriculum they have an opportunity to follow. If, for example, students spend time calculating answers to multiplication problems, they will learn how to multiply. If, in addition, they solve problems in which they choose from among several operations the ones appropriate to a particular problem, they will learn when to multiply. From this perspective, the quality of schooling is affected by the character of the academic work students do and the relation of this work to the expected outcomes of schooling.

Recently some attempts have been made to understand academic work in terms of the tasks secondary students encounter in science, English, and mathematics classrooms (see Doyle, 1983; Doyle & Carter, 1984; Doyle, Sanford, Clements, French, & Emmer, 1983). This approach is especially useful for examining the nature of students' engagement with the curriculum. The approach also provides supervisors and teachers with a language for talking about the curriculum in use in a classroom.

Academic Tasks

The curriculum exists in classrooms in the form of academic tasks that teachers assign for students to accomplish with subject matter. A task consists of:

1. A product, such as words in blanks on a worksheet, answers to a set of test questions, or an original essay;

2. Operations to produce the product, for example, copying words off a list, remembering words from previous instruction, applying a rule (such as "Plural nouns use plural verbs") to generate words, or making up "creative" or "descriptive" words;

3. Resources, such as directions to use their notes from a previous lecture, consult the textbook, not to talk to other students, or not to use examples given in class;

4. The significance or "weight" of a task in the accountability system of a class, for example, a grammar exercise might count as a daily grade whereas an essay might count 15% of the grade for a 6-week term.

The concept of "task," in other words, calls attention to four aspects of a class assignment: a goal state or end product to be achieved, a problem space or a set of conditions and resources available to accomplish the task, the cognitive operations involved in assembling and using resources to reach the goal state, and the importance of the work to be done. These aspects provide students with essential information about how they are to work with subject matter. From this perspective, the tasks students accomplish shape their learning in fundamental ways. In addition, attention to the nature of academic tasks is necessary for understanding effective practices in secondary classrooms.

Teachers affect tasks, and thus learning, by describing assignments, providing explanations about the processes that can be used to accomplish the work of the assignment, serving as an instructional resource while students are working, and managing accountability. These dimensions of a teacher's influence on academic work are discussed in more detail in the section on the quality of instruction. But first we will examine more closely the different types of tasks students can encounter in classrooms.

Cognitive Level of Academic Tasks

The cognitive level of academic task refers to the cognitive processes students use to accomplish it. For many tasks, the primary emphasis is on (a) memory or having students reproduce information they have already seen (e.g., spelling); (b) formulas or having students apply a standardized procedure for generating answers (e.g., grammar rules or mathematical formulas); or (c) search and match or having students identify passages in a text that answer factual "study" questions. Studies indicate that such tasks are quite common in secondary classes (Doyle et al., 1983; Farren, 1983).

Other tasks reflect an emphasis on higher cognitive processes. At the core, higher cognitive processes involve decisions about how to use knowledge and skills in particular circumstances. A task involving a higher level process might require students to recognize transformed versions of information or a formula they have already learned. For example, students might be asked to recognize the law of supply and demand in a particular historical case or situation. At more advanced levels, students might have to (a) select an operation or combination of operations to solve a word problem in math, (b) draw inferences from information given to formulate new propositions, or (c) plan a goal structure for a complex writing assignment. The focus in tasks involving higher cognitive processes, then, is on comprehension, interpretation, flexible application of knowledge and skills, and assembly of information and resources from several different sources to accomplish work.

Greeno (1983) has provided an instructive example of a higher level cognitive process, namely, the process of constructing a semantic representation of word problems in mathematics. He summarizes evidence suggesting that "successful students form intermediate representations that include relations among the quantities in a problem" (Greeno, 1983, p. 7) before they decide which computational procedure is applicable. Expert problem solvers, in other words, begin work on a problem by doing a "qualitative" analysis to understand what its elements are, how they are related, and how their magnitude changes in the problem situation (see also Heller, Reif, & Hungate, 1983). They then use this semantic representation of the problem to select the operations or equations to be used in computing an answer. Less successful students, on the other hand, skip this step and try to match computational procedures to the problem immediately.

Unfortunately, much of the instruction in mathematics omits this intermediate step of qualitative analysis. In presenting problem-solving strategies, teachers often focus on calculations rather than the interpretive analyses and strategic decisions that must be made to apply knowledge to specific cases. In addition, for many math assignments students are told in advance which formulas or equations they are supposed to use in solving a set of problems and thus have limited opportunity or need to formulate semantic models of problems. As a result, students often become proficient in how to calculate solutions but do not learn when to use these skills or how to apply them to unfamiliar situations.

One way to visualize a program of academic work in a class is to see each task as defining a gap in information that students have to provide by themselves. Small gaps can be crossed by reproducing information previously seen or by recalling and using a reliable formula. Larger gaps require that students organize information and connect what is known to the particular conditions of the task. Research cited in the next section indicates that gaps of different sizes are associated with different configurations of classroom events and processes.

Two comments are in order concerning this description of academic work. First, the same "content" can be represented by fundamentally different tasks. For example, writing may occur as a sentence-combining task in which students put short sentences together to form more complex sentences or as a composing task in which they must struggle to express their own interpretations and meanings. A list of topics a teacher covers gives only minimal information about the actual curriculum in use in a class. To understand and improve the opportunities students have to learn the curriculum, it is necessary to examine the tasks a teacher requires them to accomplish with content. Indeed, the academic task framework provides a language for instructional supervisors to talk with teachers about the content of their classes in terms of the assignments made, the resources available to students, and the degree of accountability for work.

Second, not all students necessarily accomplish tasks with the operations intended by the teacher. Some complete their work in ways that circumvent the learning of subject matter by, for example, copying work from someone else or guessing at answers. At a more serious level, some students misinterpret assignments or use inappropriate strategies and inaccurate information to get the work done. For example, a student might always subtract smaller numbers from larger numbers regardless of their sequence in a problem, or he or she might have basic misconceptions about the laws of motion. If a teacher focuses only on whether students' answers are "correct" rather than the thinking used to obtain the answers, such misconceptions are seldom noticed or corrected. One of the major tasks of a teacher is to monitor how students are doing academic work by asking strategic questions to reveal a student's understanding of the content. Serious deficiencies in students' understanding can result when such monitoring does not occur (see Erlwanger, 1975).

Issues of Task Variety and Challenge

Critics of secondary schooling have recently bemoaned the dulling sameness of the curricular landscape and the absence of intellectual challenge and excitement (Boyer, 1983; Goodlad, 1984). For these critics, secondary school improvement requires, first and foremost, a sharp increase in the variety of tasks in classrooms and a serious upgrading of the cognitive level of the tasks students are asked to accomplish. The academic task model is especially responsive to this line of criticism for it provides a framework for understanding what is involved in carrying out the suggested reforms. To illustrate this utility of the model, it is applied in this section to the issues of task variety and challenge in secondary classrooms.

Research on tasks suggests that the variety and challenge of academic work is governed by powerful classroom forces (see Doyle, 1983; Doyle & Carter, 1984). One central mechanism that activates these forces is the accountability system in which academic work is embedded. In classrooms, students' work is judged by the teacher or by peers. Beginning in the elementary grades, students are sensitive to these judgments and take seriously work that carries major credit in the grading system of a class or requires that they perform in front of their fellow students (see King, 1980).

This evaluative climate of classrooms has two large effects on tasks. First, it superimposes a goal structure that is not intrinsic to the subject matter, namely, getting a good grade. Second, it engenders a concern among students for the ambiguity and risk associated with different forms of academic work.

"Ambiguity," in this context, refers to how specific the information is about the nature of an acceptable product and how reliable the operations available to students are for producing such a product. For tasks emphasizing memory or the use of a formula, students generally know what the product is in advance or can trust that the procedures, if followed, will generate an adequate product. For tasks emphasizing interpretation, assembly, and decision making, the product is, by necessity, less clearly specified in advance; if it were so specified, the students could merely copy it down or model it. Moreover, the procedures are more complex and less predictable. Thus, composing an original analytical essay is a more ambiguous task than memorizing a list of words for a spelling test.

"Risk," on the other hand, refers to the likelihood that students will be able to achieve an adequate product, the amount of "weight" the assignment carries in the class, and the extent to which criteria of adequacy will be applied strictly. Risk is affected, in other words, by how difficult a task is. Having to recall a long list of words is more risky than having to recall a short list; writing an original essay is more risky than applying a rule to choose the correct verb forms in a grammar exercise. In addition, the level of risk is defined by the amount of credit assigned to the product in the grading system. Major assignments involve greater risk than minor ones. Finally, risk is held in place by the teacher's enforcement of standards. If a wide variety of approximations of a final product are acceptable or bonus credit is plentiful, risk is reduced.

It is clear from these comments that tasks involving higher level cognitive processes or intellectual challenge bring with them high levels of ambiguity and risk for students. Students sometimes respond to these levels of ambiguity and risk by fairly direct public negotiations with the teacher. These attempts to negotiate focus on increasing the explicitness of a teacher's product specifications or the generosity of his or her judgments (see Davis & McKnight, 1976; Doyle & Carter, 1984).

But even when such direct negotiation does not occur, higher level tasks are often difficult to carry out in classrooms for two reasons. First, the flow of activity slows down in the class when students find the work difficult or risky to accomplish. In other words, when students encounter large gaps in the work system, they hesitate. This slowing down of the rhythm of a class can have serious consequences for classroom management, a topic to be discussed in greater detail later in this chapter. Second, when difficult tasks are used, students' error rates go up and completion rates go down. When this happens, problems of student attention and motivation to work can occur. These conditions create tensions in a classroom between the academic task system and the demands for pace and momentum inherent in the management of classroom groups (see Doyle, 1980; Kounin, 1970). Teachers often respond to such tensions by either reducing the cognitive demands of academic tasks or introducing surplus credit in the form of bonus points to encourage students to take the risk of leaping over larger gaps (see Doyle, 1984b; Doyle & Carter, 1984).

In sum, studies have shown that various pressures exist in classrooms to reduce the levels of ambiguity and risk associated with academic work, and these pressures make higher level cognitive tasks unstable. This research suggests that accomplishing reforms in the quality of academic work in secondary classrooms will require considerable teacher skill and determination. In particular, teachers must be able to anticipate pressures on the flow of work in the classroom and protect students' opportunities to make decisions about content. How teachers can accomplish these objectives are described in more detail in the next section on instructional conditions.

Summary

The opportunities students have to learn are shaped by the tasks teachers require them to accomplish. Teachers establish academic tasks by defining the products students generate, the cognitive operations they are to use in accomplishing work, and the resources available to them. Tasks are driven in large measure by the teacher's accountability system that defines the significance of different assignments and the criteria applied to judge adequacy of products. Tasks emphasizing higher level thinking are often difficult for teachers to manage in classrooms because of the reactions of students to the ambiguity and risk which necessarily accompanies this form of work. A major implication of this approach is that improving the academic quality of secondary schooling will require careful planning and dedication by teachers and administrators and a supportive climate for instructional improvement.

Basic Conditions of Instruction

Academic tasks define the work environment of a classroom and the context in which teaching and learning take place. Tasks determine, in other words, the substance of instruction. Teachers influence students' achievement in profound ways, therefore, through the tasks they assign. At the same time, a teacher's instructional practices affect the way tasks are enacted and the quality of the time students spend accomplishing academic work. By explaining work clearly, monitoring student progress, providing confirmation and corrective feedback, and holding students accountable for work, a teacher increases the likelihood that students will benefit from the academic work they do.

This section contains a summary of what is known about the instructional conditions which foster students' learning in secondary schools. In keeping with the previous discussion of classroom tasks, attention is given to practices associated with different types of academic work.

Direct Instruction

Research on teaching, especially the teaching of basic literacy and computational skills in elementary and junior high schools, has established support for a direct, structured, and explicit approach to instruction (see Brophy, 1979; Good, 1983; Rosenshine, 1983). Direct instruction of this nature has the following essential features:

1. Goals for students' learning are made clear;
2. Progress through tasks is carefully organized and sequenced;

3. The teacher clearly explains and illustrates what students are to learn;

4. The teacher frequently asks direct questions to monitor students' progress and check their understanding;

5. Students are given ample opportunity to practice with prompts and feedback to insure success and to correct errors;

6. Students work with a skill until it is overlearned or automatic; and

7. The teacher reviews regularly and holds students accountable for work.

Students learn more, in other words, when teachers give rich instructional support and many opportunities to receive help on the way to mastery. Such instruction obviously takes more time to accomplish than a cursory or haphazard approach to teaching.

Classroom Management

Classrooms that contain these conditions of instruction are also typically well managed. That is, rules and procedures are well established, and inappropriate and disruptive student behaviors are kept to a minimum (see Brophy, 1983; Sanford, Emmer, & Clements, 1983). Research in secondary classrooms by Emmer and his colleagues (see Emmer, Evertson, Sanford, Clements, & Worsham, 1984) indicates that good classroom management begins on the first day of school with a clear statement of rules and expectations for behavior, the introduction of procedures for routine classroom functions, careful monitoring of student compliance to rules and procedures, and early interventions to stop misbehavior when it occurs. In addition, effective managers establish a smooth running system of activities to organize students for work on academic tasks and carefully hover over and protect this activity system from disruption as they move students through the curriculum (see Doyle, 1980, 1984a). Good managers are sensitive, in other words, to the fact that a considerable amount of organizational work must be done to create a functioning system in a class for accomplishing academic work. Moreover, they are direct and explicit in communicating their management system to students.

Instructional Functions Rather Than Teacher Behaviors

In interpreting these findings on direct instruction and classroom management, it is essential to remember that the categories represent instructional functions rather than specific teacher behaviors. This simply means that directness can take quite different forms depending upon social, cultural, and local circumstances, and the problems of achieving effective instruction vary with specific conditions, such as lesson content, objectives, types of students in a class, and time of the year (see Au, 1980; Erickson & Mohatt, 1982). Because of these variations in the ways teachers accomplish effectiveness, not all effective teachers fit a narrow profile of specific teaching behaviors. Good (1983) noted, for example, that in his field experiments "some of the control teachers . . . obtained high levels of student achievement using instructional systems that differ from those presented in the program we have developed" (pp. 137-138). The clear implication here is that classroom practices must be examined closely to determine whether essential functions are being served before judgments are made about quality. In the concluding section of this chapter some suggestions are given for avoiding pitfalls in analyzing teaching performance.

Direct Instruction and Meaning

Direct instruction does not mean rote and mindless drill. Direct instruction places a premium, rather, on telling students explicitly what they are to learn and demonstrating to them clearly the cognitive operations they are to use in accomplishing academic tasks. For example, students in direct instruction are told how to select the main idea of a passage or how to formulate a cause and effect argument. Good (1983) has used the term "active teaching" to underscore the dimension of meaningfulness in effective teaching. In active teaching, the teacher works deliberately, through explanations, modeling, questions, guided practice, and process feedback, to achieve meaningful student engagement with content. The emphasis in this approach is specifically on helping students understand what a procedure does and why it is applicable to a particular situation.

This clarity and explicitness of direct instruction or active teaching is likely to produce work that is highly meaningful to students. Indeed, such instruction is superior to the emphasis on memorization, drill and practice, and the search for decontextualized answers that is apparently common in secondary classrooms (see Goodlad, 1984). And, for most students, explicit instruction is probably superior to instruction that relies primarily on students' own abilities to infer patterns or invent procedures. Students commonly invent when they learn, but without careful teacher monitoring and assistance, their inventions can lead to serious misconceptions of content and "buggy" procedures for solving problems (see Brown & VanLehn, 1979; Eaton, Anderson, & Smith, 1984; Erlwanger, 1975; Resnick & Ford, 1981).

Applications of Direct Instruction

The direct instruction model was derived primarily from research on teaching basic reading and arithmetic skills to educationally disadvantaged students in early elementary grades. The few studies available at the secondary level indicate that a direct approach is successful in high school remedial reading (Stallings, Corey, Fairweather, & Needels, 1978) and in junior high school mathematics (Evertson, Anderson, Anderson, & Brophy, 1980).

The clear emphasis in this work, however, is on basic skills that is, the use of reasonably simple and standardized formulas or algorithms to generate answers. In addition, many of the studies focused primarily on low achieving or novice students. But students at the secondary level have a large repertoire of knowledge and skills in many school subjects and are beginning to move from concrete to formal operational thinking. They are developing, in other words, a capacity to think more analytically and abstractly than they could in the elementary grades. Moreover, the demands of the secondary curriculum shift from the basic skills of elementary school to content knowledge embedded in academic disciplines. As a result, the secondary school curriculum requires an emphasis on knowledge of specific domains, which includes theoretical understandings as well as problem-solving strategies, in addition to basic skills. In light of these considerations, it is reasonable to ask whether the direct instruction model is appropriate for secondary students and applicable to the full range of objectives contained in the curriculum.

Direct Instruction in Comprehension and Problem-solving Strategies

Recently several attempts have been made to extend direct instruction beyond basic skills to include operations involved in comprehension, problem solving, and more complex academic work (see Collins & Smith, 1980; Pearson & Tierney, 1984), and, in many instances, these attempts have been successful. Good and Grouws (1981) found, for example, that the direct teaching of problem-solving strategies in math improved the performance of junior high school students in this area. Similarly, Hansen (1981) successfully tested a direct instruction procedure for helping students make inferences in reading. An approach called "attack strategy training" was shown to be effective in helping lower achieving students learn general strategies for solving arithmetic problems of a particular type (see Carnine & Stein, 1981; Cullinan, Lloyd, & Epstein, 1981). In the field of writing, Scardamalia, Bereiter, and Woodruff (1982) devised a computerized system for helping students learn goal structures and organizational strategies by selecting from among prewritten sentences. Finally, Heller and Reif (1984) designed a procedure for making explicit the knowledge and procedures required to generate theoretical descriptions of problems in physics.

Rosenshine (1983) argues that direct instruction is appropriate, in principle, for complex strategies, including learning how to be an independent learner, and for older, higher ability students. As the age and ability of the students increase, however, the size of steps is larger and there is less need to check understanding frequently. It is also important to note that flexibility in using these strategies, that is, an ability to transfer outside of the immediate training situation, occurs only if students understand why the strategies work and are given practice in deciding when to use the strategies (see Brown & Campione, 1977; Mayer & Greeno, 1972). In other words, there must be an emphasis on meaning in strategy instruction.

Threats to Meaning in Instruction

Meaningfulness is a central ingredient in effective teaching but its existence is often perilous. In the daily routines of organizational life in classrooms, meaning can slip away or be pushed aside by other priorities and processes. It is useful, therefore, to examine some of the ways in which meaning in instruction can be threatened.

Too much emphasis on skill. Problem solving in academic subjects is not simply a matter of skill. To solve academic problems students need domain-specific knowledge in the subject area (see Resnick & Ford, 1981). Chi, Feltovich, and Glaser (1981) for example, examined differences between novice physics students and expert physicists in sorting physics problems by types. They found that experts were able to use their understanding of abstract physics principles to interpret problems in terms of underlying principles not explicitly stated in the problem texts. Novices, on the other hand, attended to isolated details and failed to make key inferences about the meaning of problems. The investigators concluded that the difficulties novices had stemmed largely from deficiencies in their theoretical knowledge of physics and how it is represented in problem situations.

Heller, Reif, and Hungate (1983) have argued from their research on problem solving in physics that, in addition to specific computational procedures, students need to be taught the domain-specific knowledge required for understanding problems, constructing problem descriptions, and selecting principles and concepts to apply to particular cases. They further suggest that this knowledge can be taught by having teachers clearly explain the processes involved in arriving at a solution strategy, having students formulate problem descriptions and think aloud as they solve problems and compare their processes to that of experts, providing coaching and guidance while students practice problem solving, constructing tasks that emphasize the qualitative or interpretive components as well as the computational aspects of problems, and testing for understanding and reasoning processes.

At the level of classroom practice, a concern for meaning would also require that a teacher focus explicitly on the semantic thread that ties tasks together across separate class sessions (see Doyle, 1984b). When students are studying topics which extend across several days, such as the nature of the scientific method or the operations of the circulatory system, a teacher needs to describe the connections between lessons in order to build broad understandings of content and place individual tasks within a wider context of understanding. In addition, a teacher needs to design tasks that require students to integrate information across individual lessons and class sessions.

In sum, meaning in school subjects often resides in the concepts and principles of the disciplines. If skills are isolated from this propositional context and are treated as interchangeable entities in the daily scheduling of lessons, then meaning is likely to be lost and students will not acquire flexibility and fluency in using their skills.

Too much emphasis on explicitness and order. Considerable attention in this review has been given to the value of explicitness and clarity in fostering student achievement. But these features can be counterproductive under certain circumstances. This effect is especially apparent when students are learning to interpret materials or problems and to make decisions about how and when to use skills and strategies. It is necessary, of course, to teach students explicitly how to interpret problems and how to make decisions. Such instruction, especially in the early stages of learning, can enhance meaning. At some point, however, the task environment must be made sufficiently ambiguous to give students room to exercise these operations. Students must, in other words, be given opportunities within the task system to go beyond the information given and struggle with meaning on their own. Too much explicitness concerning the operations to use or the nature of the final product reduces the need for students to engage in this struggle. As a result, they are not afforded the opportunity to learn key aspects of the content.

Class sessions in which students are struggling for meaning are likely to appear less well organized and efficient than sessions devoted to explicit instruction in skills or strategies (see Doyle, 1984b). As noted earlier, ambiguous tasks are inherently unstable and students are likely to hesitate in getting started, take a large amount of time to accomplish the work, and negotiate with the teacher to increase explicitness or reduce risk. Moreover, completion rates are often low and error rates high when tasks are ambiguous. In such situations, student engagement will probably be sporadic and productivity, in terms of the number of tasks accomplished and the degree of student success, will probably be low. It is important, however, that a teacher learn to handle these pressures on classroom management if students are to receive a full range of learning opportunities in a subject.

There is an important message here for teacher evaluation. If the criteria for judging teaching place overriding emphasis on clarity, engagement, and order, it is possible that teachers will avoid ambiguous tasks because of their impact on classroom management efficiency. Teachers will be forced, in other words, to smooth out the work system in advance, emphasize skills and guided practice, and avoid tasks which require students to struggle with meaning. In such management-driven classes, it is probable that meaningfulness and higher level processing of subject matter can be pushed aside. This is not to say that inefficient instruction is necessarily meaningful or effective or that ambiguous tasks can be productive if students are not given explicit preparation in advance. The point is, rather, that evaluation must be sensitive to the overall purposes of instruction in a particular class and to the effects of different types of academic work on classroom processes.

In closing it is important to note that the threats to meaning identified here do not represent practices that are fundamentally wrong. Rather, meaning is threatened by placing too much emphasis on a single dimension of effectiveness. More is not necessarily better in teaching.

A Brief Guide to Some Programs

In the past few years, several instructional programs which embody features of effective classroom instruction and management have been designed and tested. In particular, attention has been given to the development of systems for cooperative group learning and for individualized instruction. A brief guide to these programs is presented here to suggest factors to consider in selecting programs for secondary classrooms.

Cooperative learning. Technologies for use of small cooperative groups in classrooms are aimed at improving student achievement, group cohesion, friendship patterns, and race relations in schools (see Aronson, 1978; Sharan, 1980; Slavin, 1980). One such system developed by Slavin (1980) is called Teams-Games-Tournament (TGT). In this system, students are assigned to heterogeneous teams of four or five members to prepare cooperatively for academic contests with members of other teams. For tournaments, competition is arranged between students of equivalent ability and each student has a chance to contribute to his or her team's score.

The evidence indicates that some cooperative systems increase achievement, especially for lower achieving students, and have a marked impact on group cohesion and multi-racial interactions (see Slavin, 1980). The effects for achievement appear to result from the careful planning of content necessary for conducting cooperative arrangements, the explicit structuring of academic tasks, the inclusion of all students in the work system of the class, and the degree of individual accountability for doing the work. In addition, the system provides a clear set of procedures for helping teachers implement a very complex classroom arrangement.

Individualized instruction. When instruction is individualized, learning tasks and instructional conditions are adapted to the abilities, accomplishments, or interests of different students. In contrast to group-paced instruction, students in individualized programs often follow their own curriculum and time schedule, and they spend most of their time either in small groups or by themselves with self-instructional materials. In many instances, individualized programs incorporate a learning-for-mastery format in which all students are required to achieve a criterion level but time necessary to reach the criterion is allowed to vary. In a mastery format, goals are explicit, the sequence of instruction is thoroughly structured, and testing and feedback are frequent. It is important to emphasize, however, that many mastery programs rely on group instruction rather than private self-instruction.

Some investigators have reported impressive results for mastery programs (Block & Burns, 1976), and individualized programs at the college level appear to be quite effective (Kulik, Kulik, & Cohen, 1979). Studies at the secondary level are less encouraging. Bangert, Kulik, and Kulik (1983) synthesized findings from 51 studies comparing individualized instruction, which often included a learning-for-mastery format, with conventional teaching in secondary courses. (In the secondary studies reviewed by Block and Burns, both experimental and control groups learned from self-instructional materials and no comparisons with conventional teaching were made.) Bangert and his colleagues concluded that individualized programs, in comparison with whole-class teaching, have only slight effects on achievement and no significant impact on self-esteem, critical thinking, or attitudes. The reviewers suggested that secondary students, in contrast to college students, may need more guidance, support, and external pacing of work than individualized programs typically afford.

Slavin, Leavey, and Madden (1984) have recently devised a system called Team Assisted Individualization in which students work together on individualized materials and their performance contributes to team scores. In addition, students correct one another's work so that the teacher is given more time to instruct small groups and work with individuals. This system shares many of the features of earlier cooperative models: careful planning of content, individual accountability, and access by all students to instruction.

In summary, there are three important considerations in making decisions about individualized instruction. First, in practice, individualized programs are effective to the extent that they arrange time and classroom conditions so that all students receive basic instructional support, such as clear goals, explicit teaching, and opportunities for guided practice and feedback. There is less reason to believe that adapting to particular student characteristics such as attitudes, preferences, and personality styles, will enhance achievement (see Good & Stipek, 1983). Second, adaptation sometimes results in substantial differences in curriculum across ability levels. As a result, lower achieving students are often given little opportunity to learn what their higher ability peers learn. Finally, it is often quite difficult to manage the complex arrangements and time flow problems associated with individualized instruction in classrooms (see Arlin, 1982; Soar & Soar, 1983). As a result, individualized programs can lead to a substantial loss of productive time for instruction.

Basic Principles for Instructional Decisions in Secondary Schools

This final section is focused on implications of research on effective practices in secondary classrooms. These implications are stated in the form of basic principles that can guide instructional decisions in secondary schools. In addition, an attempt is made to suggest ways an administrator or instructional supervisor might use these principles to help teachers improve instruction.

Principal 1: Pay Attention to Time

Time is a basic condition of effective teaching. Students will learn what is included and emphasized in the curriculum, and time allocations reflect the priorities and commitments of a teacher, a school, or a school district. In addition, students must be engaged with the curriculum, that is, they must spend time working successfully with content that leads to outcomes specified in the curriculum.

Don't oversimplify time, however. Focusing attention on time is likely to improve general school achievement by mobilizing and concentrating energies and resources on common instructional aims. But time is only a starting point. Merely changing time allocations or increasing the amount of poor quality instruction will not improve student learning. Moreover, teachers who are unable to achieve adequate amounts of student engagement are likely to have fundamental problems with basic management and instructional processes. Achieving effective schooling requires a consideration of how opportunities to learn are constructed for students and what basic instructional conditions exist in classrooms.

Principal 2: Examine Students' Opportuntities to Learn

The quality of the time students spend in school is affected by the nature of the opportunities they have to learn. These opportunities, in turn, are defined by the academic tasks teachers assign and hold students accountable for. Tasks differ in terms of the type of knowledge and cognitive processes required for accomplishment. Some tasks emphasize only the reproduction of information contained in texts or the application of simple and reliable formulas. Other tasks call upon higher cognitive processes of comprehension, interpretation, inference, and the assembly of information and resources to construct acceptable products.

Considerable attention has recently been given to the lack of intellectual variety and challenge in secondary classrooms and the need for more tasks involving understanding and higher cognitive processes. These proposals have merit, but classroom studies suggest that achieving this goal will be difficult. Challenging academic work is inherently high in ambiguity, risk, and difficulty for students. These characteristics of academic work generate pressures that affect the pace and flow of classroom events, the motivation of students to work, and the equity of the accountability system. In addition, students sometimes negotiate directly to increase the explicitness of task requirements or to reduce the teacher's grading standards. Such pressures often lead teachers to simplify the demands of academic work and, thus, omit important aspects of the curriculum.

Principal 3: Preserve Basic Instructional Conditions

Research supports the general use of direct, structured, and explicit approaches to instruction. Such approaches are characterized by clear goals, carefully organized and sequenced learning tasks, explicit and meaningful explanations, frequent questions to check understanding, ample opportunities to practice with prompts and feedback, an emphasis on mastery, regular reviews, and accountability for work. Achieving these conditions begins on the first day of class with a well constructed plan for organizing groups of students and managing the routine functions that occur in a classroom. Instructional programs that contain these elements of structure, guidance, and access to help are likely to be effective.

This direct approach appears to be appropriate for the content and the students in secondary classes. Indeed, considerable success has been shown recently in the direct teaching of problem solving and other higher order cognitive strategies. For more advanced students, however, the size of the steps in direct instruction are likely to be larger and the amount of prompting less than that required for novices or lower achieving students.

There are circumstances, however, in which the explicitness, orderliness, and skill development that characterize direct instruction are not appropriate. To give students room to practice interpretive skills, go beyond the information given, and struggle with the construction of meaning, it is necessary to introduce some ambiguity into task environments. Class sessions in which such tasks are being pursued are not likely to fit the profile of clarity and efficiency implied by direct instruction. The proposition should not be interpreted, however, as a blanket approval of ambiguous and inefficient teaching. To be successful with tasks involving higher order cognitive processes, teachers must carefully structure the tasks students are to accomplish, clearly focus students' attention on the operations to be learned, provide explicit instruction and models of these processes, monitor progress and provide feedback, and hold students accountable for work. In addition, teachers must have established orderly classroom routines and procedures and a climate of seriousness and civility. If these instructional and management conditions are not in place, then tasks involving higher order processes will not be accomplished and the basic orderliness of the classroom will be at risk.

Principal 4: Look Closely at Teaching and the Content of Instruction

One of the central messages of this chapter is that effective classroom practices are not always immediately obvious. It is important to remember that directness can take different forms and the basic instructional functions necessary for prompting student achievement can be expressed in different ways. In other words, don't expect uniformity. Differences at the level of specific behavior will result from such factors as the characteristics of the teacher and the students, the particular content being considered, and the qualities of the environment in which teaching and learning are taking place. Evaluation of teaching must, therefore, focus on the instructional functions being served rather than the surface forms of teacher behavior.

In addition, administrators and instructional supervisors must work to achieve a balance in interpreting classroom observations. On the one hand, ambiguity and inefficiency can signal poor planning and inadequate instruction. On the other hand, if too much emphasis is placed on explicitness, order, and the external control of teaching, problem solving, and higher cognitive aspects of the curriculum are likely to be pushed out of classrooms.

The clear sense of recent research on teaching is that understanding classrooms requires careful and continuous observation and analysis. Isolated observations of a limited number of classroom processes have been replaced by detailed analyses of the content, operations, and practices of teaching and learning. To understand the curriculum in use in a classroom, for example, it is necessary to examine how work is defined for students, what resources are available to them, and what they are held accountable for. To gather such information, it is necessary to examine, through observations and interviews, a unit of work and events that occur over several class meetings. The academic task model explicated in this chapter provides a framework for organizing such information and talking with teachers about the opportunities they afford students in their classes. With research-based frameworks such as this, the ability of supervisors to interpret and influence classroom practices can be increased substantially.

Conclusion

Considerable progress has been made recently in understanding the essential features of effective teaching practice. Although more needs to be learned about how teaching works, especially in secondary classrooms, there is a rich foundation for sustaining and enhancing the quality of schooling.

This chapter contains a summary of available knowledge about effective classroom practices in secondary schools. A special effort has been made to organize this knowledge in a form that will be useful to administrators, instructional consultants, and policy makers in carrying out their tasks of achieving educational excellence. In the end, one message is especially clear: Improving the quality of schooling requires that classroom instruction be taken seriously and that simple solutions to complex problems be recognized as fundamentally misleading.

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